RECONNAISSANCE MANUAL

FOR

CALIFORNIA

Division of Plant Disease Control
Bureau of Entomology and Plant Quarantine
102 Administration Building, Government Island
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RECONNAISSANCE MANUAL

I. Introduction

The objective of this manual is to present the approved method of performing control reconnaissance to the field man so that he may be able to carry on the work in the most effective and efficient manner. No attempt has been made to present all of the details or anticipate all of the contingencies which will be encountered in the course of the season's work.

II. Purpose

The purpose of control reconnaissance is to make a rapid and systematic survey of the sugar-pine regions to determine (1) the extent and distribution of sugar-pine types, and (2) the factors influencing the cost and methods of Ribes eradication.

III. Methods

The unit for conducting reconnaissance is the section which the reconnaissance man works alone. Four strips are run in a cardinal direction through the section, in the course of which the different timber types and ground cover types are determined. In addition, all of the Ribes by species and the sugar pine by two size classes, 0" to 8" and over 8", are counted on a strip 1/4 of a chain in width. Distances are measured by pacing and courses are determined by box compass. Strips are run at right angles to the drainages as near as a cardinal direction will permit in order to obtain a representative sample.

Two type maps are made: (1) the timber type map, and (2) the ground cover type map. Cultural features are shown only on the timber type map. The scale used for both maps is 4 inches to the mile.

IV. Reconnaissance Types

The reconnaissance types are a combination of the types used in making the California Vegetative Type Map and the ones used by the Ribes eradication forces of the Office of Blister Rust Control in the sugar-pine regions of California. The type definitions have been modified in some instances to fit the needs of reconnaissance.

A. Timber types and symbols.

1. Types for timber type maps.
   a. Cultivated: All lands which are under cultivation fall into this class.
   b. Barren: All lands which support very little or no vegetation and are usually devoid of soil are classified as barren.
   c. Meadow: Areas are classified as meadow land when the ground cover is grass. The soil and water conditions are usually unfavorable for tree or shrub growth.

d. Stream: This is a narrow belt of land along streams, draws, and swamps varying in width with the topography, along which occur concentrations of Ribes in association with any one or all of the following plants: willows, alders, red osier, dogwood, azaleas, and herbaceous plants. This is the only type on which Ribes must be present in order to designate it as a type.

e. Brush: All lands where the ground is partially or completely covered by brush with trees or reproduction entirely absent or too sparsely scattered to revert to timber type for many years to come fall into this classification.

f. Timber: This is the most common of all types and is represented by all timbered areas supporting either mature timber or reproduction. If the timber has been either logged or burned and there remains only a brush cover on the area, it is classified as brush type. On the other hand, if a few trees escape the fire or logging operations, or if the area is being well stocked by reproduction, timber type is the proper classification.

(Subclassification of Timber Type)

Timber type is further classified into other types, the basis for which is the prevalence of the species in the stand. Timber type as such is never recorded on the maps but it is the subclassification based on prevalence of species which actually concerns the reconnaissance field man. In determining timber types, species are placed in order of their commercial importance. In order to form part of a type, a species must make up 20% or more by volume of the stand. For example-- if ponderosa pine, Douglas fir, and white fir each constitute 20 percent or more of the stand by volume, the type is ponderosa pine-Douglas fir-white fir and is represented by the symbol Ydw. If sugar pine should also appear in the same stand and constitute 20 per cent or more of the stand by volume, the type would be sugar pine-ponderosa pine-Douglas fir-white fir, and the symbol SYdw. Obviously a type could not have over five species and the average number is from two to three. A pure stand is one in which a single species constitutes over 80 percent of the dominant cover. A pine stand is represented by a one-letter symbol as-- ponderosa pine type with symbol Y. In deciding whether or not to call a type sugar-pine type, count the trees in the immediate vicinity and should there be two or more sugar pines for every fourteen trees of approximately the same diameter, the type is sugar pine. Obviously this is less than 20% by numbers but sugar pines of the same diameter as the associated trees usually have a greater volume. This is the system used by the California Forest Experiment Station in determining sugar-pine types.

2. Common types, symbols, and color legends for timber type maps. The following is a list of the more common types, type symbols and color legends which appear most frequently on the timber type maps. With a few exceptions, they are the same as the ones used in the "California Vegetative Type Map":

Types	Symbol	Crayon Dixon's
Sugar pine-Douglas fir	SD	Blue #350
Sugar pine-ponderosa pine	SY	Olive Green #325
Sugar pine-Jeffrey pine	SJ	" " "
Sugar pine-ponderosa pine-Douglas fir	SYd	Green #354
Sugar pine-ponderosa pine-fir		
" " " " -red fir	SYr	Green #354
" " " " -white fir	SYw	" "
" " " " -Shasta fir	SYs	" "
" " " " -white fir-red fir	SYf	" "
Sugar pine-ponderosa pine-Douglas fir-fir		Light Green #354½
" " " " " " -white fir	SYdw	" " "
" " " " " " -red fir	SYdr	" " "
" " " " " " -white fir-red fir	SYdf	" " "
Sugar pine-Douglas fir-fir		Sky Blue #320
" " " " -white fir	SDw	" " "
" " " " -red fir	SDr	" " "
" " " " -white fir-red fir	SDf	" " "
Sugar pine-fir		
" " -white fir	SFw	Sky Blue #320
" " -red fir	SFr	" " "
" " -Shasta fir	SFs	" " "
" " -white fir-red fir	SF	" " "
Barren	Ba	Uncolored
Cultivated	Cu	Pink #322
Brush	Br	Sepia #335
Meadow or grass land	Md	Golden Yellow #353
Non-sugar pine		Uncolored

Symbols for non-sugar pine types are obtained by removing the prefix "S" from the symbols for sugar pine types. The order of the symbols is always the same as shown above.

Cut-over types are designated by the addition of CO to the type symbol (as SYd CO) and the circumscription of all cut-over areas with this symbol - - - ⊥ ⊥ ⊥ ⊥. The short, perpendicular lines face the cut-over land. The color legend is the same as the one used for virgin timber.

For the Jeffrey pine, substitute "J" for "Y" in the above symbols. The color legend is the same as that for ponderosa pine.

Cedar and oak are not considered in any of the types.

To denote the presence of Big Trees (Sequoia washingtoniana) use the appropriate timber type disregarding the Big Trees and outline the area with a broken red line (- - - -) and designate by symbol Bt.

Stream type is shown by placing red dots evenly spaced on each side and close to a stream. The stream is drawn in with blue ink.

B. Ground cover types and symbols.

1. Ground cover types.- Ground cover types are recorded on the maps to show how much brush and reproduction cover the ground. The types may be made up of either brush or reproduction or a combination of thw two. The brush or reproduction may be either in small dense clumps or evenly distributed over the area. The following is a list of the different ground cover types:

a. Brush or reproduction (0-4): The density of the brush or reproduction ranges from zero to four-tenths.*

b. Brush or reproduction (4-7): This is the same as above except that the brush density is from four to seven-tenths.

c. Brush or reproduction (7-10): This type is similar to types a and b except that brush density ranges from seven to ten-tenths.

d. Meadow (Md): Areas are classified as meadow land when the ground cover is grass. The soil and water conditions are generally unfavorable for tree or shrub growth. This is the same as the meadow type that appears on the timber type map.

Bear clover--a low-growing, woody shrub--is not considered as brush in blister-rust-control reconnaissance. Whenever bear clover is found to any extent in association with brush or reproduction, the bear clover symbol BC is placed beneath the symbols of the ground cover type.

The minimum size of a ground cover type is 40 acres with the exception of meadows and brush or reproduction from seven to ten-tenths which are typed to a minimum of 10 acres.

2. Symbols for ground cover types.- The legend and symbols for the ground cover map are as follow:

Brush or reproduction	-	Br. or Rp. 0-4
" " "	-	Br. or Rp. 4-7
" " "	-	Br. or Rp. 7-10
Meadow	-	Md.
Bear clover	-	B.C.

When brush and reproduction are found together on an area, the symbols are "Br. and Rp." followed by the appropriate density sign as "Br. + Rp. 0-4".

V. Procedure

A. Mechanics of running strips.

Starting at a section corner a 10-chain offset is made along the section line by the aid of the compass, then the first strip, running in a cardinal direction, and through the middle of the first tier of 40's is begun.

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*Density of ground cover is expressed in tenths, based upon ten-tenths as a complete cover.

On a continuous strip 16½ feet in width Ribes and sugar-pine data are recorded by 5-chain transects. The transects are numbered consecutively. There are 16 of these transects in a mile. After the 70-chain mark has been reached, it is a good plan to be on the alert for blazed lines crossing the strip. Although section lines are not always blazed, if they are, it will assist in locating section corners. When 80 chains appear on the tally register, a mark is scraped in the duff with the foot and careful note is made of the immediate vicinity so that the point can be found again. An offset of 10 chains is made in the direction of the section corner and after the corner is located errors in alignment and distance are recorded on the Ribes data sheet underneath the last transect. Errors in distance are recorded as "long" or "short" and alignment as "right" or "left". "Short" means that 80 chains appears on the tally register before the section line has been reached and "long" that the section line has been crossed. Right or left denotes on which side of the true strip the compass line falls. An example of a tie is-- 2 long, 2 right - meaning that the section line has been over-paced two chains and that the compass line actually fell two chains to the right of the true strip. After the tie has been made to the section corner, an offset of 30 chains is made along the section line in the direction of the quarter corner. At the 30-chain point, a mark is made in the duff by scraping with the foot. The compass line is continued for another ten chains to the quarter corner. After the quarter corner has been found, pace back to the 30-chain mark which should be 10 chains from the quarter corner. If the quarter corner is not found, then it is necessary to return to the 30-chain mark. The second strip is 20 chains from the first strip and parallel to it. The data are recorded in the same manner as on the first strip.

On reaching the end of the second strip, offset 10 chains to the quarter corner and record errors of distance and alignment. In the event that the quarter corner cannot be found, the tie will be made either to the section corner or the beginning of the first strip. For this reason it is always a good plan to mark plainly where strips begin and end. This can be done by scraping a line in the duff with the foot and by hanging a piece of paper or cloth on a tree. Marking strips will also assist in making ties when adjacent sections are worked. Should a strip parallel a water course for some distance, offset far enough to get away from the influence of the stream and return to the original strip as soon as possible.

B. Making field maps.

After the section corner is found, a record is made of it on the map. The different type boundaries are observed along the strip and recorded lightly on the maps by means of small penciled dots. Frequently the timber types follow exposures and ridges. The cultural features such as main ridge tops, streams, roads, trails, etc., are recorded on the map as they are encountered on the strip. The type boundaries and cultural features are connected up when succeeding strips are run in the section. Number each strip with a roman numeral at the edge of the type map and indicate by an arrow the direction in which the strip was run. Label all important rivers, highways, resorts, ranger stations, etc. When offsetting along the section lines, all important features are also drawn on the map. It is a good plan to orient the map whenever any work is done on it.

The following cultural features should be shown with their proper conventional signs:

	Color of Ink
Primary roads	Black
Forest Service truck trails	Black
Trails	"
Stream, running	Blue
Intermittent	Blue
Ditch or flume	Black
Railroad	Black
Abandoned railroad	Black
Fence	Black
Ridge, main	Black
Stream type	Line - Blue Dots - Red
Timber type line	Red
Cut-over line	Vertical - Black Curved - Red
Dwelling: Ranger Station	Black
Cliffs	Black
Swamp	Blue
Section corner found	Black
Section corner not found	Black

When a section which adjoins sections already worked has been assigned, trace lightly upon the field maps the points at which the type boundaries, roads, trails, streams, etc. enter the section. Label all of the types. This will facilitate jibing and greatly aid field work.

After the field mapping has been completed for a number of adjacent sections, there still remains an important task, that is, the jibing and matching of type lines, roads, trails, streams, etc. between sections. This should be done just as soon as the adjacent sections are progressively worked and while the country is still fresh in the minds of the mappers. As soon as the maps are jibed they will be inked and colored according to standard color legend.

Type lines are not drawn between 0-4 brush or reproduction and 0-4 brush and reproduction nor between 4-7 brush or reproduction and 4-7 brush and reproduction. However, 7-10 reproduction brush or reproduction and brush are separated by type lines.

Non-sugar-pine types, except brush, meadow, and cultivated lands, are not colored.

C. Recording data.

1. Ribes data.- The Ribes data for all of the types on a strip are recorded by species in transects (5 chains long and 16½ feet wide) in the columns to the right of the maps. Whenever stream type is encountered, the Ribes on the stream type are recorded on the reverse side of the map sheet. The Ribes found in stream type are also recorded on the front of the map sheet under strip data in the transect or transects in which they fall. For example-- if three chains of transect No. 1 with 50 Ribes fall into timber type and 2 chains (the balance of the transect) with 150 Ribes, into stream type, record the 150 Ribes on the back of the map sheet and then total the Ribes for the transect and record them under No. 1. The stream plots are indicated on the maps by small squares and numbered as they are established.

2. Sugar pine data.- The sugar pine data are recorded by two size classes, 0"-8" and all over 8", for each 5-chain transect (16½ ft. wide) on the sugar-pine data sheets. The diameter of the trees is measured at the ground line. The trees may be recorded directly into their respective columns by means of dots as they are found or they may be put down on a piece of scratch paper and recorded in the notebook at the end of each transect. In no case should the mapper attempt to retain all of the data for the transect in his mind.

In the columns headed "over story" on the data sheet, the timber species are listed in order of their predominance by volume; in the columns headed "under story", timber species under 12" D.B.H. are listed by species in order of their numerical abundance. This information is taken at the end of each transect by facing the direction from which the strip is being run and by estimating the number of trees within two or three chains of

the transect just completed.

Record all information asked for on the back of the map sheet. Write down the section corner description while at the corner. If no Ribes or trees are found on a transect, draw a line through the blank space. This will help eliminate some of the error in recording data and will assist in keeping a check on distance.

VI. General Information

Accuracy and neatness are essential to good field work. Endeavor to letter as neatly as possible. Take plenty of time to count Ribes and sugar pine for the value of the data depends upon the accuracy of the count. Cultivate the ability to distinguish Ribes and sugar pine readily.

Make notes on any points about the work which are not clear and ask the Chief of Party. Do not guess.

No smoking is allowed outside of camp.

All Forest Service regulations must be obeyed.

Reconnaissance men are subject to the call of the District Ranger for fire duty.

APPENDIX

INFORMATION ON PACING, COMPASS WORK, AND PUBLIC LAND SURVEYS

I. Pacing

Pacing is the method of measuring distance by counting steps of a known length. It is usually employed to measure horizontal distances and while it is not as accurate as instruments, a man with practice can obtain a degree of accuracy that is suitable for rough work.

A. Procedure.

Although a pace is defined as one step, in general practice it is considered as two steps (a stride) or the distance between the heel of one foot and the heel of the same foot when it next touches the ground. Since the length of pace varies with individuals, the best way for a man to ascertain the length of his pace is to measure off on level ground a course of several chains and to pace this distance enough times to determine the number of paces per chain. A man should walk naturally while determining his pace as this results in each pace being more nearly the same length. To be able to pace under adverse conditions with the required degree of accuracy, it will be necessary to pace over measured courses running up and down slopes of different degrees and through brush to determine the allowance necessary under these conditions. Definitely known distances between points such as section corners offer a good opportunity to check pacing. The individual may find it necessary to increase or decrease the number of paces per chain during the summer.

B. Instruments used.

A box compass is ordinarily used to determine courses for pacing; it is as accurate as the pacing method of measuring distances requires. A description and discussion of the box compass appear later.

A tally register is frequently used to count paces and is usually carried in the left hand with the thumb working the lever each time the left foot touches the ground. The tally register should be checked every few chains to see if it is functioning properly as it is occasionally a source of error. Turn the register back to zero each time a new strip or line is being started to prevent error from this source. If it becomes clogged, wash it in kerosene and add a few drops of oil.

C. Factors influencing the accuracy of pacing.

There are several factors influencing the accuracy of pacing but with care these can be sufficiently overcome to obtain the desired results. They are as follow:

1. Topography. Land surveys are based on horizontal distances, consequently allowances at all times must be made in pacing for various degrees of slope. The number of paces per chain will have to be increased when traveling up or down slopes. Occasionally in rough country and in dense

brush it is more accurate to estimate short distances than it is to pace them. Where difficulties are encountered it is always more accurate to increase the number of paces per chain or estimate the number of paces for short distances than it is to try to maintain the same length of pace that is taken on level ground.

2. Ground cover. Dense reproduction, brush or bear clover, or a combination of these make accurate pacing more difficult. This is especially true when they are encountered on a steep slope and additional care must be taken under these conditions.

3. Condition of soil. Loose, rocky, or swampy soils are more difficult to pace on than a firm, dry soil.

4. Rain and wind increase the difficulties of obtaining accuracy.

5. Human factors. A man's vitality may decrease after a hard day's work, a poor night's sleep or with physical illness, and as a result he is apt to under-pace. On the other hand, in the morning, immediately after leaving difficult country, or when he is in a hurry, he is apt to lengthen his stride and over-pace. A man's pace is shorter when he is traveling slowly than when moving at his natural rate. Whenever a man leaves the compass line during his work, a mark in the duff, a pile of stones, or a stake should be left to indicate the point; otherwise the work must be redone or an error is likely to occur.

II. The Box Compass

A. Description of the compass.

The essential parts of the box compass are a magnetic needle for finding a meridian line, a horizontal, graduated circle for laying off angles from this meridian, and sights attached for use in prolonging lines on the ground. On circles graduated from 0° to 90° the 0° points are marked N and S and the 90° points are lettered E and W. Some compasses are graduated from 0° to 360° in which case the E point is 90°, S is 180° and W is 270°. Usually the north end of the needle is marked with an arrow and the south end is weighted with a wrapping of wire. The direction which the north end of the needle assumes is called the magnetic north. Since the needle always points to magnetic north and the box turns under it, the letters E and W on the box are reversed from their natural positions so that the reading of the north end of the needle will give not only the angle but also the proper quadrant. The angle between the magnetic north and true (geographic) north is called the declination of the needle. In California the declination varies from about 17° to 20° east of the true north according to the locality.

B. How to use the compass.

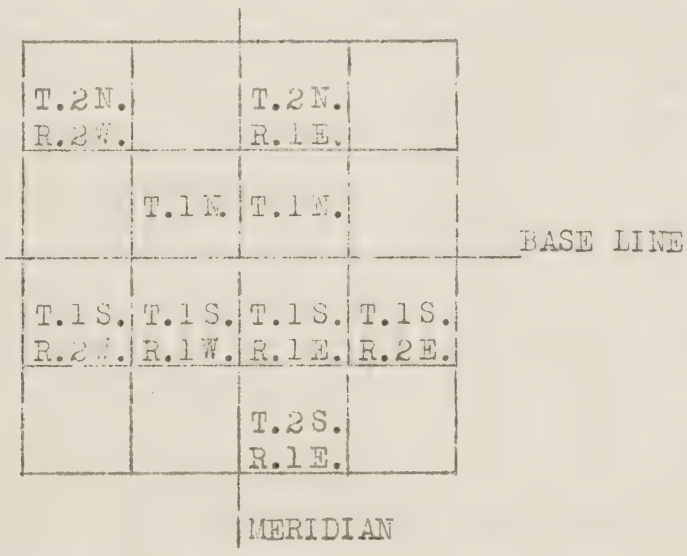
Before using the compass, the graduated circle must be shifted to the right (clockwise) until the declination reading coincides with the white line along the lid of the compass. Then when the needle points to 0°, the line of sight on the lid of the compass points to true north.

Likewise when the needle points to E 90°, even though the letter is on the left side of the compass and pointing north, the line of sight is true east.

In taking a sight, the compass should be level, with the lid pointing away from the person's body until the north end of the needle comes to rest at the desired bearing. Then sight along the white line on the lid of the compass which is always the line of sight to be followed, and proceed in that direction. If the needle does not swing freely or is caught, the small lug in the upper left corner will release it. Metallic articles that will attract the needle must be kept away from the compass or a false reading may be obtained. A moist finger touched to the glass of the compass will release any magnetism that might be affecting the needle. When the course has been determined, pick out an object along the line of sight as a guide and proceed to it, then take another sight, etc. For best results, the elbows should be held firmly against the body and the compass held in both hands. Before moving after taking a sight, the compass should be closed because this not only avoids injury to the needle and pivot but also saves time when the next shot is taken as this always leaves the needle pointing to the bearing of the line being followed. Time will be saved and certain errors avoided if the north end of the needle is always read.

C. Public land surveys.

Most lands in the United States have been surveyed under the rectangular system of public land surveys. The land is divided into townships which are usually six miles square. The townships are located north and south of a base line and east and west of a meridian by range. For example--township 1 north, range 2 east. The system of numbering is as shown below:

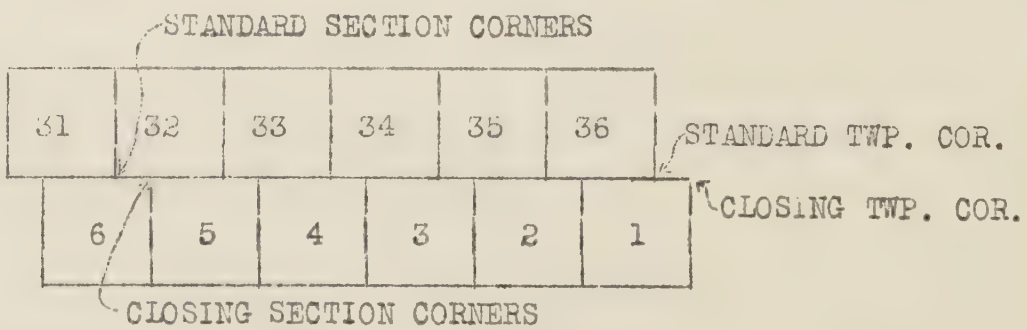


The township is divided into 36 sections which are usually one mile square. They are numbered as below:

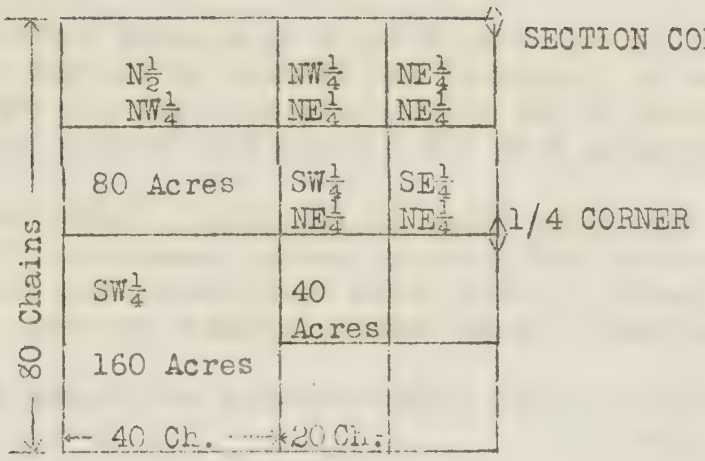
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

A section usually contains 640 acres and is 80 chains on a side but may often be irregular in shape and more or less than 80 chains square. Section lines are usually run in true cardinal directions, but may be several degrees off from the true line.

Corrections for cumulative differences and errors in the lengths of section lines are made along township lines, hence frequently section corners which should be common to the sections in two adjacent townships will not coincide. When this is the case, corners will be found for the sections in each township. These corners should all be shown on the map. The diagram below illustrates this point.



The section has the following subdivisions:



The maps of the area will usually show any inequalities in the township and sections.

Section lines and corners are the two most important landmarks to be found in the woods. Most of the boundaries used in blister-rust work are section lines.

Line trees are those directly on the section line; they are blazed on opposite sides, either with one or with three blazes one above the other, the blazes facing forward and backward along the line. Trees near the line are scored with two blazes (or two sets of three) quartering toward the line, and the farther the trees are from the line the nearer together the blazes are placed and vice versa. These blazed trees are of great use in marking and finding the position of a line through timber. Sometimes blazed lines are found in the woods which are not section lines; here care is essential or they are apt to cause a great deal of trouble. Scars due to fire or injury should not be confused with line blazes. Tally stakes may sometimes be found along the line. A tally is five chains.

An X or cruiser's tag on a tree along a trail or road designates a section-line crossing. The township, range and section are marked on the tag, together with the distance to the nearest corner (usually) and a tack gives the location of the marker in a diagrammatic section.

Section and quarter corners in mature timber are designated either by a stake or a pile of stones and witness trees. The corner stake when present is scribed with the township and range and the sections to which it is common. Section corners usually have four witness trees--one in each section. These are marked with a blaze about 6" to 8" wide and 12" to 16" high about a foot above the ground. The blaze faces the section corner and is scribed with the township, range and the section in which the tree is found and is marked "B.T." (bearing tree). The old witness blazes are usually grown over forming a scar about 18" long. The witness trees are sometimes tagged with cruiser's tags and "Attention" signs. Many cruisers have marks (monograms) of their own that they cut in the bark of a tree near the corner. These marks often aid in locating a corner.

The quarter corner stake is usually scribed with the fraction 1/4 S. There are generally two witness trees, one for each section, which are blazed in the same manner as those for section corners and are usually scribed with 1/4 S above the letters "B.T.".

Do not blaze trees in the woods, particularly in the vicinity of section corners and section lines. Meaningless blazes too often obscure true survey marks and make their recognition and location difficult. Blazes in the woods should have a definite meaning.

Regular Forest Service trails are blazed with an inverted exclamation mark.

When searching for section corners, look for blazes, stakes, tags, cruisers' monograms, and piles of rock. Do not give up too easily; search the ground thoroughly and systematically for at least seven chains in all directions from where the corner should be, since the pacing or alignment or both may be off. In logged areas most of the blazed trees have been cut, and even the corner and witness trees are occasionally destroyed. If this is the case, search the stumps for bearing tree blazes.

Corners, witness trees, section lines, etc. are usually found as described above but many variations occur.

I. WHITE PINE BLISTER RUST - LIFE CYCLE AND HISTORY

White Pine Blister Rust, the fungous disease which threatens destruction to the western white pine of the Inland Empire and the sugar pine of California and southern Oregon, can be controlled. The hope for effective control of this disease lies in the fact that a secondary host plant is necessary to complete the life-cycle of the fungus which causes the disease. The rust cannot spread from pine to pine; it must go through a stage of development on intermediate host plants, currant or gooseberry bushes, commonly known in control work as Ribes. While this disease can spread long distances from pine to Ribes, the spread from Ribes to pine can take place over relatively short distances up to only a few hundred feet. The fact that it is impossible for infection to spread from pine to pine, coupled with the short distance spread from Ribes to pine makes possible the control of this disease by the eradication of Ribes from within and around any stand of pine which warrants protection.

Blister Rust is slow but sure in action. While it may take twenty or thirty years to kill mature pine, the younger stands will be wiped out in a few years unless control measures are applied. The rust first appears on pines as a yellowish discoloration of the bark accompanied by a slight swelling. The canker continues to develop and spread until the trunk or branch is killed by girdling. Some branch cankers will spread to the bole and kill the tree. While this is taking place, the cankers are scattering Ribes-infection spores to the four winds through a fruiting process. Each spring small whitish sacs containing a reddish rust push their way through the diseased area of the bark and burst open, liberating millions of spores. These spores have relatively thick walls, live for a long time and can infect Ribes up to distances of more than 200 miles.

The rust appears on the under-surface of the Ribes leaf as orange-colored spots or pustules. This spring and early summer stage produces spores which can spread from leaf to leaf or locally from bush to bush. Later in the summer small hair-like columns grow from the diseased area of the leaf. These hair-like structures produce the only type of spore which can infect the pine. These spores have extremely thin walls and live for only a few minutes which explains the short distance spread from Ribes to pine. The disease enters the pine through the needles and grows in the inner bark becoming visible from 1 to 3 years after infection.

Blister rust has an interesting history. Commonly believed to have originated on Pinus cembra in Siberia, it was first discovered in the Baltic provinces of Russia in 1854 on both Ribes and pine. During the three decades following 1860, it spread generally over the range of pine in western Europe where during the middle of the 19th century the white pine of eastern America was used extensively in reforesting. Damage from blister rust has been so severe that the use of white pines in reforesting and the growing of white pines for profit have been largely given up.

While blister rust was taking such a heavy toll in Europe, the planting of white pine in the Eastern United States and Canada had increased so

rapidly that our nurseries could not supply the demand. During the last few years of the last century and early in the present century white pine was imported from Europe. Through this importation of nursery stock blister rust gained a foothold in eastern America about 1898. As the disease does not become visible until some time after infection, it is probable that the rust could not be detected when these imported trees were planted. It was discovered in the state of New York in 1906 on the cultivated black currant and in New England on native pines in 1915 and 1916. It has spread generally over the Northeastern states, southward as far as Virginia and westward into the Lake states region where it was located in 1918.

The spread of blister rust to the West from eastern infection centers was prevented by the strict enforcement of quarantine laws which prohibited the shipment of host plants to points west of the Mississippi. The rust became established in the West however in the same way as in the East, by the importation of European nursery stock. Discovered at Vancouver, B. C. in 1921 the rust was traced to a shipment of pines from France to Vancouver in 1910. Since its introduction blister rust has spread eastward through the interior of British Columbia to the Inland Empire and southward through the coastal region of Washington and Oregon almost to California.

While the rust became established in the Inland Empire in 1923 it was first located in 1927 on Ribes near the Falls Ranger Station on the Kaniksu National Forest, Idaho and in the spring of 1928 on pines at Newman Lake, Washington. Since that time 128 additional centers of pine infection have been found in the white pine forests of North Idaho, 15 of which originated in 1923. Ribes infection may be found each year generally distributed over the white pine belt of the Inland Empire.

The most southerly known pine infection center in the West was located in Oregon in 1934 on Steamboat Creek in the upper drainage of the North Umpqua River in Douglas County, approximately 100 miles from California. Infection on Ribes has been found on the Oregon coast less than 50 miles from the California line. Blister rust is not located usually for some time after its introduction to a region and while extensive scouting in northern California has thus far failed to reveal the presence of the rust, it is entirely possible that it has already become established in the sugar pine stands of northern California.

While control of this disease has not been attempted seriously in Europe, practical and effective control measures have been instituted in the eastern United States and are being developed in the Lake States. In the West conditions are entirely different to those in the East and the pine is more susceptible to blister rust. Several years experimentation and development have resulted in practical control methods, proper application of which with adequate follow-up maintenance work will result in protecting our valuable stands of white pine and will reduce a virulent type of forest disease to the status of a minor pest.

HOW BLISTER RUST SPREADS.

(1-1/3 Nat. size)

Ribes inerme (white-stemmed gooseberry)

1. Leaves - smooth, 5-lobed, deeply cleft, 1 to 3" broad, margins thin and large-toothed.
2. Stems - slender, usually erect, bark whitish, 1 to 3 short spines at nodes or wanting, spines softer and fewer than those on R. roezli.
3. Flowers - greenish or purplish, 1 to 3 in cluster.
4. Fruit - smooth, shiny, round, black or deep purplish.
5. Habitat - 3,000 to 8,000; swamps or bordering sluggish streams usually intermingled with willows, alders or other vegetation.

(2 X Nat. size)

Ribes lasianthum (gooseberry)

1. Leaves - generally hairy on both surfaces, deeply 3 to 5-lobed, roundish, 1/2 to 3/4" broad.
2. Stems - rigidly and intricately branched, bark white and shreddy; 1 to 3 slender spines at nodes; rarely with prickles.
3. Flowers - clusters 1 to 3-flowered (rarely 3 or 4), yellowish, hairy and cylindrical.
4. Fruit - reddish or crimson berry--without hair or glands, round and small.
5. Habitat - open, dry sites only rarely found in the higher altitudinal range of sugar pine.

Compiled by
W.W. Spinney - Oakland 3/35

(Nat. size)

Ribes roezli (prickly-fruited gooseberry)

1. Leaves - smooth to densely hairy on both surfaces, 3-5 cleft into toothed lobes, seldom more than 1" wide, generally less.
2. Stems - stout and smooth, erect from ground tending to spread and droop. 1-3 spines at nodes.
3. Flowers - deep red or purplish, one or two in cluster, long, tubular.
4. Fruit - yellow or purple to deep red, spined berry, pleasant to taste, only spiny fruited gooseberry in S.P. type of Sierra Nevadas.
5. Habitat - generally distributed on all slopes and sites 3,000 to 7,000 ft.

(Nat. size)

Ribes nevadense (Sierra Nevada currant)

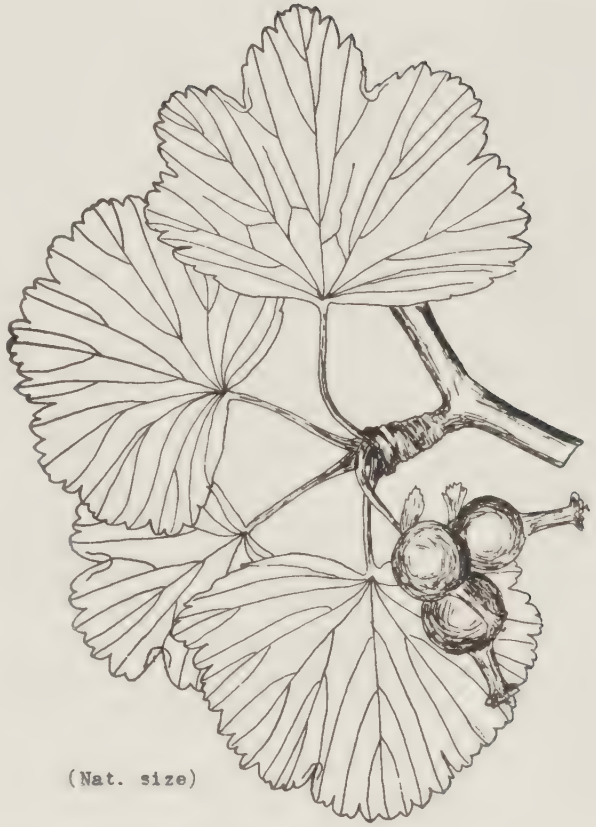
1. Leaves - smooth above and nearly or quite so below. 3 to 5 lobes slightly cleft, margins fine-toothed, 1½ to 3" broad, reclining.
2. Stems - slender and erect, smooth, no spines.
3. Flowers - rose color to red in many-flowered clusters.
4. Fruit - black with bloom, smooth, round, sharp musty taste.
5. Habitat - 3,000 to 7,000; abundant along streams and on wet sites.

Compiled by
W. W. Spinney. Oakland 1/30

(½ Nat. size)

Ribes viscosissimum (Sticky currant)

1. Leaves - thick, hairy and sticky, noticeable spicy or peppery odor when crushed, (shallowly, 3-lobed, rounded) 1½ to 3" broad, deep-veined, giving a crinkly effect.
2. Stems - smooth, erect but spreading, reddish, shreddy bark, no spines.
3. Flowers - light green, sometimes tinted with purple--3 to 13 flowered, erect clusters.
4. Fruit - black, sticky, oblong, noticeably ribbed, sticky hairs present.
5. Habitat - high altitude, under timber, all sites 4,500 to 5,500.



(Nat. size)

Ribes cereum (squaw currant)

1. Leaves - smooth, heavy odor but not so pronounced as R. viscosissimum; slightly sticky, wide, 3 or 5-lobed shallowly cleft. 1/2 to 1½" broad.
2. Stems - stiff, much-branched, smooth, no spines--always erect, but spreading.
3. Flowers - white or pinkish--clusters 2 to 9-flowered and drooping.
4. Fruit - red, round, smooth and slightly sticky.
5. Habitat - all high sites, 5,000 to 12,000 ft. in fir types.

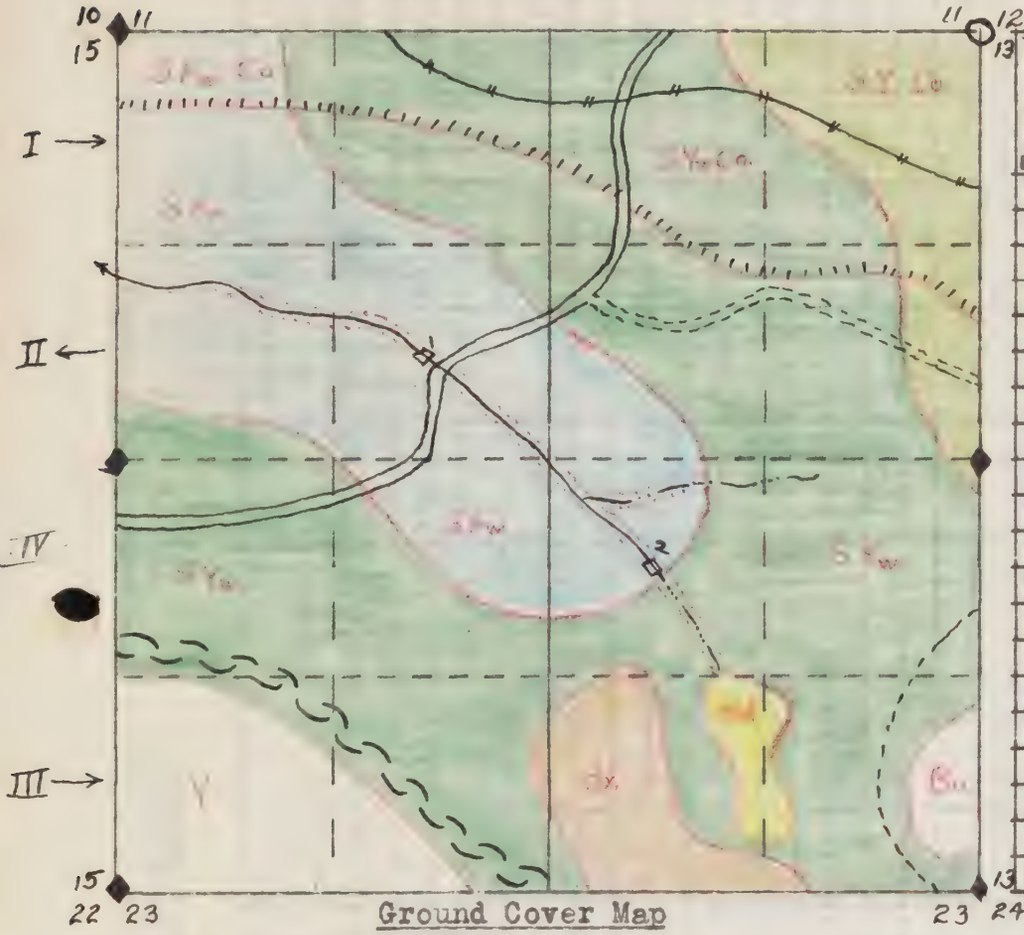
Compiled by
W W Spinney - Oakland 9/20

WF-BRC-#241-4/3/35

RIBES RECONNAISSANCE MAP AND RIBES DATA

Sec. 14 T.10 S.R.25E Locality Ellis Meadow Mapped by L.A.Strong Date 6/14/35

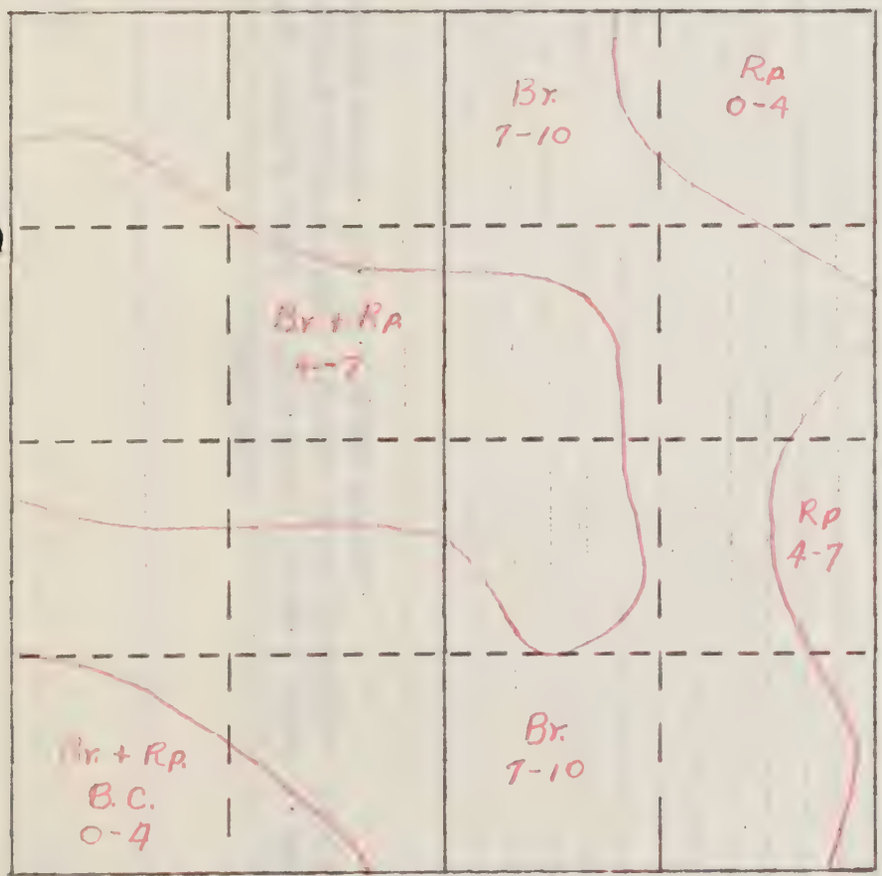
Timber Type Map



Strip Data

Transect Number	STRIP #1 R. roe	STRIP #1 R. nev	STRIP #2 R. roe	STRIP #2 R. nev
1	15	-		
2	10	-		
3	25	-		
4	36			
5	18	-		
6	22	-		
7	5	-		
8	3	-		
9	14	3		
10	19	-		
11	23	-		
12	36	-		
13	4	-		
14	-	-		
15	-	-		
16	1	-		
	4 chs. Right			
	3 chs. Short			

Ground Cover Map



Scale 4 inches = 1 mile.

	STRIP #3 R. roe	STRIP #3 R. nev	STRIP #4 R. roe	STRIP #4 R. nev
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Transects 5 chains long

STREAM PLOTS

Strip No.	Plot No.	Length of Plot	Width of Type	Ribes roezli	Ribes nev.				Remarks
II	1	1½ ch	1 ch	12	25				Very brushy along stream; steep topog., large R. nev.
IV	2	1 ch	1 ch	4	17				bushes; intermittent stream, large boulders, Ribes
									bushes small. No. br. along stream.

Timber Summary Excellent S in SFw type (60% of stand); NE¼S timber fair--S20%-30%. Y type poor timber; Few scattered S in Br type. SYw type fair timber except in SW¼ (S20%-25%)

Brush Ceanothus cordulatus primarily, few scattered clumps of Prunus and Arctostaphalus potula.

Section Cor. description $\frac{10}{15}\frac{11}{14}$ Pile of rocks, 3Fw BTs, 1SP BT; $\frac{11}{14}\frac{12}{13}$ Cor. not found; 1/4 14/13; stake 38" SP BT. Cruise tag on road 8 chs. N. of cor.; 1/4 15/14 2 YP BTs. Cruise tag on road 5 chs. S of cor. $\frac{15}{22}\frac{14}{23}$ 4 YP BTs. Cruise tag facing N $\frac{14}{23}\frac{13}{24}$; Stake, pile of rocks, 1 Fw BT, 3 YP BTs, 2 cruise tags, cruise tag on trail 6 chs. W. of cor.

Camp Site Descriptions: Possible camp site where main road crosses stream in NW¼. Plenty of water.

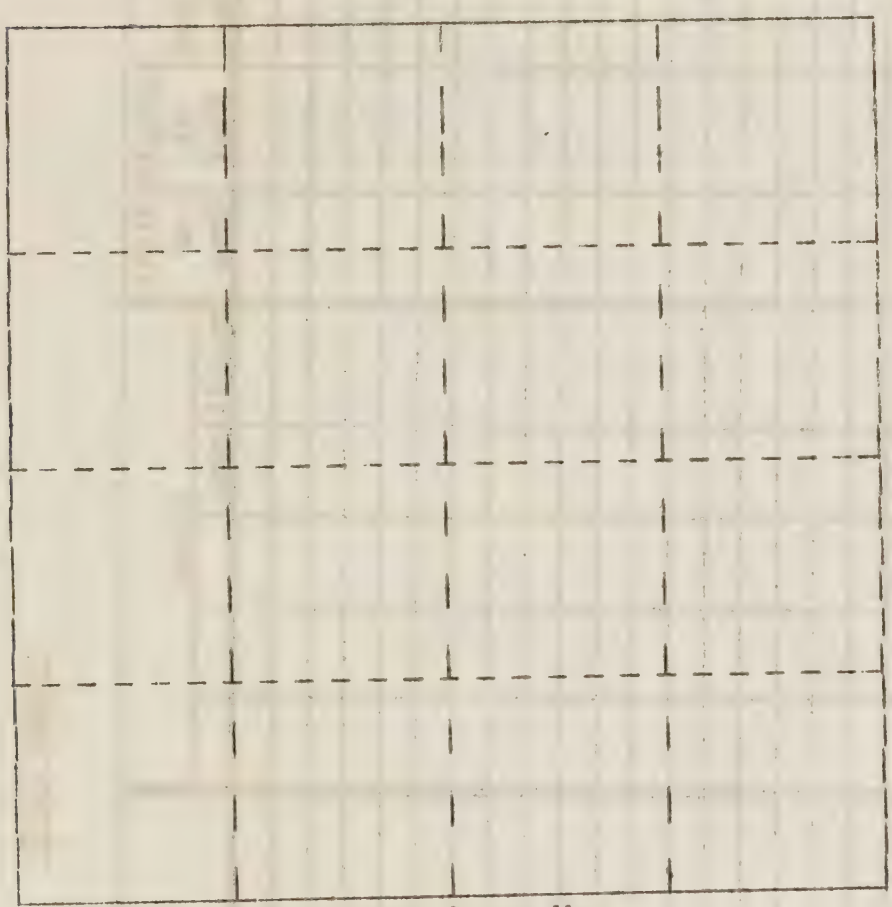
Eradication problems 7-10 Br. has Ribes scattered throughout--some brush slashing will have to be done; stream type difficult--large R. nev. bushes, brushy and steep along stream.

WF-B&C-241 4/3/35

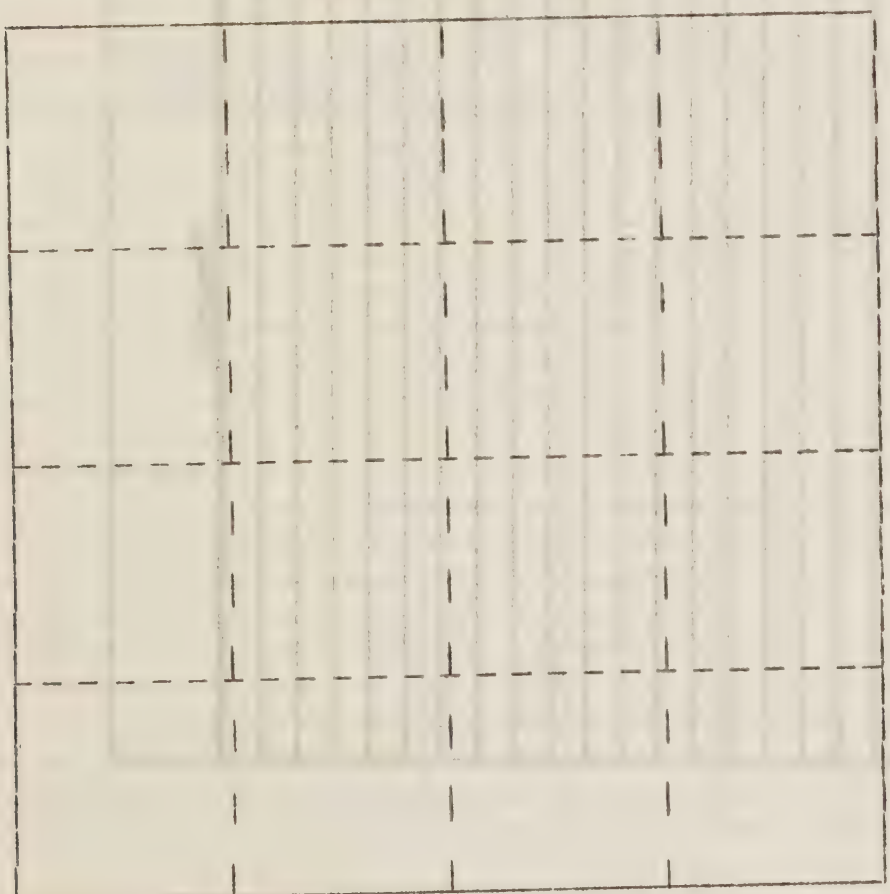
RIBES RECONNAISSANCE
MAP AND RIBES DATA

Sec. T. R. Locality Mapped by Date

Timber Type Map



Ground Cover Map



Scale 4 inches = 1 mile.

Strip Data

Trans. No.	STRIP #1				STRIP #2			
	R. roe	R. nev			R. roe	R. nev		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

Trans. No.	STRIP #3				STRIP #4			
	R. roe	R. nev			R. roe	R. nev		
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

Transects 5 chains long.

STREAM PLOTS

Strip No.	Plot No.	Length of Plot	Width of Type	Ribes					Remarks
				roezli	nev.				

Timber Summary

Brush

Camp site descriptions

Section corner description

Eradication problems

WF-BRC-# 242 4/19/35

CONTROL RECONNAISSANCE SUGAR PINE DATA

Section_____T._____R._____ Locality_____Notes by_____

Strip No. 1					Strip No. 2				
			Composition					Composition	
Trans. No.	Sugar Pine Count 0-8"	Sugar Pine Count Over 8"	Over Story	Under Story	Trans. No.	Sugar Pine Count 0-8"	Sugar Pine Count Over 8"	Over Story	Under Story
1					1				
2					2				
3					3				
4					4				
5					5				
6					6				
7					7				
8					8				
9					9				
10					10				
11					11				
12					12				
13					13				
14					14				
15					15				
16					16				

Strip No. 3					Strip No. 4				
			Composition					Composition	
Trans. No.	Sugar Pine Count 0-8"	Sugar Pine Count Over 8"	Over Story	Under Story	Trans. No.	Sugar Pine Count 0-8"	Sugar Pine Count Over 8"	Over Story	Under Story
1					1				
2					2				
3					3				
4					4				
5					5				
6					6				
7					7				
8					8				
9					9				
10					10				
11					11				
12					12				
13					13				
14					14				
15					15				
16					16				

Trans. No.	Super Flue Count		Composition	
	0-8"	Over 8"	Over Story	Under Story
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Strip No. 1

Trans. No.	Super Flue Count		Composition	
	0-8"	Over 8"	Over Story	Under Story
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Strip No. 2

Trans. No.	Super Flue Count		Composition	
	0-8"	Over 8"	Over Story	Under Story
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Strip No. 3

Trans. No.	Super Flue Count		Composition	
	0-8"	Over 8"	Over Story	Under Story
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Strip No. 4